

Psychological resilience, perceived stress, and emotional eating behavior: Their impact on type 2 diabetes risk

Resilience, Stress, and Emotional Eating in T2DM

Sedat Özdemir¹, Özlem Kardaş Kin², Emel Gulbahar³

¹ Department of Internal Medicine, Gaziantep Islamic Science and Technology University, Gaziantep, Türkiye

² Department of Operating Room Services, Vocational School of Health Services, Gaziantep Islamic Science and Technology University, Gaziantep, Türkiye

³ Department of Clinical Psychology, Oğuzeli State Hospital, Gaziantep, Türkiye

Abstract

Aim: This study aims to investigate the impact of coping mechanisms—particularly emotional eating behavior—on the risk of developing Type 2 diabetes among individuals with low psychological resilience and high perceived stress levels.

Materials and Methods: A cross-sectional research design was employed, including 328 participants. Data were collected using the "Personal Information Form", "Emotional and Stress-Related Eating and Evaluation Scale", and "Psychological Resilience Scale (PRS)".

Results: An increase in the Challenge subscale score was found to significantly decrease the risk of Type 2 diabetes, whereas higher scores on the Difficulty in Coping subscale were associated with an increased risk. A positive correlation was identified between body mass index (BMI) and emotional/stress-related eating, while a negative correlation was observed between psychological resilience and BMI. Female participants demonstrated significantly higher levels of emotional eating and perceived stress compared to males.

Discussion: Psychological resilience and effective coping strategies serve as protective factors against stress and emotional eating behaviors that influence the risk of Type 2 diabetes and BMI. Considering gender differences, the development of individualized and interdisciplinary interventions within the fields of nursing, medicine, and psychology is recommended.

Keywords

type 2 diabetes, psychological resilience, perceived stress, emotional eating

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Corresponding Author: Ozlem Kardaş Kin, Department of Operating Room Services, Vocational School of Health Services, Gaziantep Islamic Science and Technology University, Gaziantep, Türkiye.
E-mail: kardas.ozlem@hotmail.com P: +90 342 909 75 00
Corresponding Author ORCID ID: <https://orcid.org/0000-0001-6637-5786>
Other Authors ORCID ID: Sedat Ozdemir, <https://orcid.org/0000-0003-3858-2408> · Emel Gulbahar, <https://orcid.org/0009-0000-2142-7773>
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Introduction

It is thought that as exposure to stressors increases and emotional arousal intensifies, individuals may fail to distinguish between physical hunger and emotional cues, perceiving this arousal as hunger and consequently exhibiting a tendency toward overeating. Research supporting this view indicates that individuals exposed to high levels of stress tend to engage in increased food intake [1,2].

The perception of chronic illness, its impact on daily life, and the complications that develop during the disease process can lead to psychological problems. While blood glucose levels can induce mood changes, psychological problems, and stress, they also serve as risk factors in the development and progression of diabetes. Although individuals with diabetes are frequently monitored for glycemic control and complications, their psychological states are often not adequately assessed [3]. Since blood glucose levels directly affect brain function and emotional states, emotional and psychological changes, in turn, influence glucose regulation [4]. Wojujutari et al. (2024) reported that the relationship between psychological resilience and depression is particularly pronounced among individuals with Type 2 diabetes [5]. According to Fletcher and Sarkar (2013), psychological resilience refers to an individual's ability to maintain positive adaptation and functioning in the face of adversity or significant stressors [6], while Bartone et al. (2008) conceptualized it as a personality trait that enhances one's capacity to cope with stress [7]. Navuluri (2000) found that individuals with diabetes who have higher levels of psychological resilience tend to use self-management strategies more effectively to control their condition [8]. Similarly, Bartone et al. (2016) demonstrated that individuals with lower levels of psychological hardiness exhibited higher blood pressure and unfavorable lipid profiles, suggesting that reduced resilience may contribute to increased cardiovascular and metabolic risk [9].

Previous studies have reported that individuals with diabetes exhibit higher rates of eating disorders, disordered eating behaviors, and post-traumatic stress symptoms compared to non-diabetic individuals. Those who experience frequent hypoglycemic episodes have been found to develop long-term personality changes, depression, cognitive impairments, and, in rare cases, psychotic symptoms [10,11]. Baran et al. (2020) identified food addiction in 39.1% of individuals with Type 2 diabetes [12].

When evaluating individuals' dietary patterns or proposing lifestyle modifications, it has been emphasized that a multidimensional approach—taking into account factors such as food addiction—yields more effective outcomes [13]. In particular, understanding the relationship between eating behaviors and psychological resilience can contribute to more effective management of Type 2 diabetes. Therefore, the aim of this study is to examine the effects of coping mechanisms—particularly emotional eating behavior—on the risk of developing Type 2 diabetes among individuals with low psychological resilience and high perceived stress.

Materials and Methods

Study Design

This research was designed as a descriptive and cross-sectional

study. This study used a cross-sectional design; therefore, findings indicate associations only and cannot infer causality. A total of 328 individuals who applied to the Internal Medicine Outpatient Clinic of Gaziantep Oğuzeli State Hospital between September and October 2025 and met the inclusion criteria were included in the study.

Sample

Assuming an unknown prevalence of 50%, with a 5% margin of error and a 95% confidence interval, the minimum sample size for an unknown population was calculated as 384 [14]. When the size of the target population is unknown, the formula $n = t^2pq/d^2$ is applied: $n = 1.96^2 \times (0.5 \times 0.5) / 0.05^2 = 384.16$.

In our study, although the planned sample size was 384 participants, a total of 328 participants were reached based on voluntary participation during the data collection process. To assess the impact of this difference on statistical power, a post-hoc power analysis was conducted. The analysis indicated that with a 95% confidence level, a 5% margin of error, and a target power of 80%, the sample size of 328 was sufficient. This result ensures the reliability and validity of the statistical analyses.

Inclusion Criteria

- Individuals aged 18 years and older
- Voluntary participation in the study

Exclusion Criteria

- Unwillingness to participate in the study

Data Collection Tools

To ensure confidentiality, the questionnaire form was created using a Google Forms URL. The survey link was distributed to students and healthcare professionals via WhatsApp. Prior to completing the survey, participants were informed about the study's purpose, and their consent was obtained. Participants were invited via an online survey, and the proportion of healthcare workers in the sample may represent a potential sampling bias. This limitation has been considered in the interpretation of the findings.

Personal Information Form; developed by the researchers based on a review of the literature, this form includes 11 questions evaluating participants' sociodemographic characteristics and diabetes-related conditions [1,4].

Emotional and Stress-Related Eating and Evaluation Scale (EADES); this instrument was developed by Ozier et al. (2022) to assess individuals' emotional eating behaviors and stress-related eating habits [15]. The Turkish adaptation and the validity–reliability study were conducted by Yilmaz (2024) [16]. The scale consists of three subdimensions: (1) emotional and stress-related eating, (2) assessment of coping ability and resources, and (3) assessment of external influences and stress sources. These subscales are scored within the following ranges: 24–120, 20–100, and 5–25, respectively. Items are rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The Cronbach's alpha coefficients for the three factors were found to be $F1 = 0.935$, $F2 = 0.902$, and $F3 = 0.708$, indicating moderate to high reliability.

Psychological Resilience Scale (PRS); developed by Isik (2016), the PRS is a five-point Likert-type instrument ranging from (0) “strongly disagree” to (4) “strongly agree” [17]. It consists

of 21 items reflecting individuals’ beliefs about life and themselves, with items 2 and 15 reverse-scored. Exploratory and confirmatory factor analyses confirmed the scale’s three-factor structure, comprising Commitment (items 1, 2, 3, 5, 6, 18, 21), Control (items 4, 10, 11, 12, 15, 19, 20), and Challenge (items 7, 8, 9, 13, 14, 16, 17). The Cronbach’s alpha reliability coefficient was .76 for the total scale, and .62, .69, and .74 for the Commitment, Control, and Challenge subscales, respectively.

Statistical Analysis

Data were analyzed using the SPSS 25.0 statistical package program. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used. Reliability analysis (Cronbach’s alpha), Pearson correlation analysis, independent samples t-test, and one-way ANOVA were employed for data interpretation. The normality of numerical variables was assessed using skewness and kurtosis values. Pearson correlation analysis was used to examine the relationships between continuous variables. Differences between two independent groups were analyzed using the t-test, while one-way ANOVA was applied for comparisons among three or more groups. Logistic regression analysis was performed to evaluate the influence of relevant parameters. A significance level of $p < 0.05$ was considered statistically significant.

Ethical Approval

This study was approved by the Ethics Committee of Gaziantep Islamic Science and Technology University (Date: 2025-06-29, No: 2025-2ÖNP-0264).

Results

Among the 328 participants included in the study, 56.7% were female and 43.3% were male, with the majority being single (60.7%). Regarding educational level, most participants were university graduates (45.7%), followed by those with primary (21.6%), secondary (10.4%), and high school (12.8%) education; 5.8% held a postgraduate degree. In terms of lifestyle factors, 20.7% were current smokers and 9.1% were former smokers, while alcohol use was reported by 8.5% (current) and 7.3% (former) of the participants. Approximately half of the sample (49.1%) reported having a chronic disease, and 42.7% had been diagnosed with Type 2 diabetes. The mean age of participants

was 40.83 ± 17.87 years (range: 18–94), and the mean body mass index (BMI) was 27.06 ± 5.6 , indicating that participants were, on average, overweight to mildly obese. This demographic and clinical composition provides an appropriate sample for evaluating the effects of psychological resilience, stress, and eating behaviors on Type 2 diabetes and metabolic health.

A significant positive correlation was observed between age and BMI ($r = 0.52$, $p < 0.001$), indicating that BMI increases with age. Emotional and stress-related eating was moderately and positively correlated with BMI ($r = 0.28$, $p < 0.001$), suggesting that emotional eating behaviors are associated with higher BMI. The difficulty in coping subscale was positively correlated with both BMI ($r = 0.13$, $p < 0.01$) and emotional/stress-related eating ($r = 0.16$, $p < 0.01$), implying that individuals with poorer coping abilities tend to engage more in emotional eating and have higher BMI values.

Negative correlations were found between the psychological resilience subscales (commitment, control, and challenge) and BMI (r ranging from -0.20 to -0.41 , $p < 0.001$), indicating that higher resilience is associated with lower BMI. A strong negative relationship was also observed between total psychological resilience and difficulty in coping ($r = -0.61$, $p < 0.001$), showing that resilience is inversely related to perceived coping difficulty. Moreover, a significant positive correlation was identified between emotional/stress-related eating and external stressors ($r = 0.31$, $p < 0.001$), suggesting that external stress stimuli may increase emotional eating behavior. Overall, the observed correlations were consistent with prior literature indicating inverse associations between psychological resilience and both BMI and emotional eating.

Gender-based analyses revealed that females scored significantly higher than males on the emotional and stress-related eating ($t = 2.89$, $p = 0.004$, $d = 0.32$) and external stressors ($t = 3.75$, $p < 0.001$, $d = 0.42$) subscales. These findings suggest that women are more vulnerable to stress-induced eating behaviors and external stress stimuli (Table 1). No significant gender differences were found in difficulty in coping, commitment, control, challenge, or total psychological resilience scores ($p > 0.05$). This indicates that coping abilities and resilience levels are similar across genders, but women

Table 1. Comparison of scale scores by gender groups

Scales	Groups	n	Mean ± SD		t (df)	p	d
Emotions and Stress Eating	Female	186	37.49	10.62	2.89 (326)	.004	.32
	Male	142	34.18	9.71			
Difficulty Coping	Female	186	26.731	6.33	0.81 (326)	0.41	
	Male	142	26.Kas	7.40			
Impact of External Stressors	Female	186	37.46	7.14	3.75 (326)	<001	.42
	Male	142	34.30	8.5			
Dedication	Female	186	20.72	4.62	-0.87 (326)	0.39	
	Male	142	21.16	4.44			
Control	Female	186	21.Şub	4.84	1.395 (326)	0.16	
	Male	142	20.27	4.87			
Challenge	Female	186	24.19	5.32	1.50 (326)	0.14	
	Male	142	23.30	5.38			
Psychological Resilience Total	Female	186	65.93	13.20	0.82 (326)	0.42	
	Male	142	64.73	13.29			

may be more sensitive to emotional and stress-related eating. Overall, these findings highlight the potential importance of gender-specific interventions aimed at reducing stress and emotional eating, particularly among women.

Analyses based on the presence of Type 2 diabetes revealed that individuals with diabetes had significantly higher difficulty in coping scores ($t = -2.77, p = 0.005, d = -0.31$), suggesting greater challenges in managing stress. Although differences in emotional and stress-related eating and external stressors were not statistically significant, emotional eating scores were slightly higher among participants with diabetes ($p = 0.09$). Scores on the psychological resilience subscales — commitment ($t = 3.89, p = 0.001, d = 0.43$), control ($t = 5.04, p = 0.001, d = 0.56$), challenge ($t = 6.79, p = 0.001, d = 0.76$) — as well as total resilience ($t = 5.95, p = 0.001, d = 0.66$) were significantly higher in non-diabetic participants. These findings suggest that psychological resilience may play a protective role in reducing Type 2 diabetes risk and underscore the importance of enhancing coping strategies in diabetes management (Table 2).

Logistic regression analysis demonstrated that emotional and stress-related eating and difficulty in coping did not significantly predict Type 2 diabetes ($p > 0.05$). However, external stressors significantly increased diabetes risk ($p = 0.02$; Exp (B) = 1.04), while total psychological resilience and the challenge subscale significantly decreased it ($p < 0.001$;

Exp (B) = 0.94 and 0.83, respectively). These findings indicate that higher psychological resilience — particularly the ability to view stress as a challenge — serves as a protective factor against Type 2 diabetes, whereas exposure to external stressors increases the risk (Table 3).

Discussion

In this study, while the control and commitment subscales of psychological resilience did not significantly predict Type 2 diabetes, each one-point increase in the challenge subscale reduced the likelihood of diabetes by approximately 15%. Similarly, Mohammadi et al. (2022) reported that all three dimensions of psychological resilience — control, commitment, and challenge — were positively correlated with illness perception and self-efficacy among individuals with diabetes [18]. Consistent with these findings, a one-unit increase in psychological resilience was shown to decrease the likelihood of developing Type 2 diabetes by 5%. Moreover, Wojujutari et al. (2024) demonstrated that psychological resilience partially mediated the relationship between diabetes-related stress and depression ($b = -0.10, p < 0.05$) [5]. These findings indicate that psychological resilience plays a crucial role in preventing the transformation of stress into depression. While the stress–depression link tends to be more pronounced among individuals with Type 1 diabetes, the protective effect of resilience appears stronger among those with Type 2 diabetes. The observed

Table 2. T-Test results of psychological scale scores according to type 2 diabetes diagnosis

Scales	Groups	n	Ort.	SS	t	df	p	d
Emotions and Stress Eating	Yes	140	37.20	10.18	-1.72	326	.09	-.19
	No	188	35.22	10.42				
Difficulty Coping	Yes	140	27.66	7.71	-2.77	326	.005	-.31
	No	188	25.57	5.93				
Impact of External Stressors	Yes	140	37.04	7.41	-1.95	326	.06	-.22
	No	188	35.37	7.84				
Dedication	Yes	140	19.80	5.10	3.89	326	.001	.43
	No	188	21.729	3.90				
Control	Yes	140	19.19	5.14	5.4	326	.001	.56
	No	188	21.82	4.32				
Challenge	Yes	140	21.63	5.31	6.79	326	.001	.76
	No	188	25.43	4.79				
Psychological Resilience Total	Yes	140	60.61	14.3	5.95	326	.001	.66
	No	188	68.98	11.40				

Table 3. Logistic regression results of psychological factors affecting type 2 diabetes risk

	B(SH)	Wald	SD	p	95% Confidence Interval of Exp(B)		
					Lower limit	Exp(B)	Upper limit
Fixed	2.99(1.32)	5.13	1	0.02	19.84		
Diabetes Diagnosis Yes/No	Emotions and Stress Eating	0.01(.01)	.60	1	0.44	.99	1.1
	Difficulty Coping	-0.03(.02)	2.3	1	0.15	.93	.97
	Impact of External Stressors	0.04(.01)	4.75	1	0.02	1.00	1.4
	Dedication	0.02(.04)	.36	1	0.55	.95	1.2
	Control	-0.02(.04)	.28	1	0.60	.89	.97
	Challenge	-0.18(.04)	17.67	1	<.001	.77	.83
	Psychological Resilience Total	0.05(.01)	29.32	1	<.001	.93	.94

associations may be explained by underlying biological mechanisms. Chronic exposure to stress and external stressors can elevate cortisol levels, which in turn may contribute to insulin resistance and impaired glucose regulation. This stress hormone response can promote emotional eating behaviors, weight gain, and metabolic dysregulation, thereby increasing the risk of Type 2 diabetes. Conversely, higher psychological resilience may buffer the physiological impact of stress, helping to maintain more stable cortisol levels and better metabolic control.

Logistic regression analyses revealed that emotional and stress-related eating and perceived stress subscales did not significantly predict Type 2 diabetes; however, increases in difficulty in coping scores significantly elevated the risk of developing diabetes. This finding aligns with the studies of Hackett and Steptoe (2017) and Sinha and Jastreboff (2013), both of which emphasized that psychological stress and inadequate coping contribute to the etiology of Type 2 diabetes by promoting metabolic dysregulation and energy imbalance [19,20]. The logistic regression results indicate that total psychological resilience (Exp (B) = 0.94) and the challenge subscale (Exp (B) = 0.83) significantly reduce the risk of Type 2 diabetes, whereas external stressors increase the risk (Exp (B) = 1.04). These findings quantitatively demonstrate the protective role of psychological resilience and the risk-enhancing effect of external stress. Gender analyses further support that women are more sensitive to stress-induced eating behaviors, as indicated by Cohen's *d* values (*d* = 0.32–0.42).

In the present study, body mass index (BMI) was positively correlated with emotional and stress-related eating but negatively correlated with psychological resilience. These results are consistent with prior literature suggesting that difficulty in coping with stress and emotional eating behaviors are significant determinants of BMI. Guerrini-Usubini et al. (2023) reported that difficulties in emotion regulation increase psychological distress and emotional eating, consequently elevating BMI [21]. Likewise, Braden et al. (2025) found that emotional eating is particularly prevalent among obese adults and shows a positive association with BMI [22]. Accordingly, psychological resilience and effective coping strategies may protect metabolic health by preventing excessive weight gain, and interventions aimed at strengthening emotional regulation could yield beneficial outcomes for both psychological and physical well-being.

Gender-based analyses revealed that, while no differences were observed in psychological resilience or coping difficulty, women reported significantly higher levels of emotional and stress-related eating and perceived stress compared to men. This finding is in line with Du et al. (2022), who found that emotional eating mediates the relationship between perceived stress and BMI among women [23]. From a sociocultural perspective, women's stress coping styles and emotional eating behaviors may be influenced by societal expectations and cultural norms. Studies indicate that women are more sensitive to social pressures regarding body image and appearance, which can exacerbate emotional eating and stress responses [24]. Furthermore, difficulties in emotional regulation have been shown to contribute to stress-induced eating behaviors

among women [24,25]. Cultural context also plays a significant role, as evidenced by research demonstrating that women's experiences of emotional eating are shaped by the prevailing social norms and values in their communities [25]. Therefore, gender-sensitive psychological interventions and coping strategies should not only address individual behavioral and emotional factors but also consider the broader sociocultural influences that may affect women's stress and eating patterns.

Limitations

This study has several limitations. First, its cross-sectional design prevents the establishment of causal relationships between psychological resilience, emotional eating, perceived stress, and the risk of Type 2 diabetes. Second, self-reported data may be subject to recall and social desirability bias. Third, the sample was limited to individuals applying to a single hospital, which may restrict the generalizability of the findings to broader populations. In addition, the use of an online questionnaire for part of the data collection may have excluded individuals with limited internet access or technological literacy. Future longitudinal and multi-center studies using objective clinical and biochemical measures are recommended to confirm and expand upon these findings.

Conclusion

This study demonstrates that psychological resilience plays a significant role in reducing the risk of Type 2 diabetes and mediating the relationship between stress and depression. While difficulty in coping, emotional eating, and stress-related factors exerted a limited effect on diabetes risk, the observed associations between BMI, emotional eating, and gender differences highlight the relevance of metabolic and psychological interconnections. The higher levels of emotional eating and perceived stress among women underscore the necessity of gender-specific interventions. Strengthening psychological resilience and coping mechanisms may serve as protective factors for both mental and metabolic health.

Professional Recommendations

Nurses: Assess stress, emotional eating, and coping difficulties; provide brief counseling and educational interventions to enhance resilience.

Physicians: Include stress management and behavioral interventions in treatment plans, alongside routine metabolic monitoring.

Psychologists: Implement cognitive-behavioral and mindfulness-based programs to improve emotion regulation and coping, tailored to individual and gender-specific needs.

Overall, fostering resilience-based, gender-sensitive, and interdisciplinary strategies could significantly contribute to the prevention and management of Type 2 diabetes.

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Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content, including study design, data collection, analysis and interpretation, writing, and some of the main line, or all of the preparation and scientific review of the contents, and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with

the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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